Bryant (H.) D. Channing with the author's regards

THE

RADICAL CURE

OF

INGUINAL HERNIA;

BEING

A DISSERTATION

WHICH OBTAINED THE BOYLSTON PRIZE FOR 1847,

ON THE FOLLOWING QUESTION:

"Is there any Certain and Safe Manner of accomplishing the Cure of Common Inguinal Hernia?"

BY HENRY BRYANT, M.D.

INGENIUM HUMANUM MAVULT IMPLICATIORES ET OPEROSOS RESPECTUS PRÆ SIMPLICI VERITATE. — *Stahl.*

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The following votes were adopted by the Boylston Committee in 1826: —

"1. That the Board do not consider themselves as approving the doctrines contained in any of the Dissertations to which the premium may be awarded.

"2. That, in case of the publication of a successful Dissertation, the author be considered as bound to print the above vote in connection with it."

PREFACE.

THE author of the following Dissertation has been induced to publish it, by seeing an advertisement in the "Medical Journal" requesting that any information on this subject might be communicated to the Committee appointed by the American Medical Society to report on the Radical Cure of Reducible Hernia.

Immediately after presenting this Dissertation to the Examining Committee, the author sailed for Europe, with the intention of studying anatomy and operative surgery in Paris. Duing his residence there, he made all the inquiries in his power on the subject; and the result of these inquiries was such as to cause him to consider the conclusions arrived at in this Dissertation to be the opinion of the first surgeons of Paris.

He has consulted in its composition all the works of the first English and French surgeons, and has collected all the cases which he could find, either in surgical works or reviews. He makes no pretension to originality, but hopes that it will be found a correct statement of the results of the different operations, so far as they had been made public in 1847.

DISSERTATION.

The frequent occurrence and easy recognition of Inguinal Hernia caused it to be noticed by the earliest writers on surgery; and the radical cure of this disease has always excited a greater or less degree of interest, from the time of Celsus to the present day. It was formerly considered as a disgrace to be affected with hernia; and this impression had no slight effect in multiplying the attempts that were made to find a remedy at once "certain and safe." It is the success or non-success of these attempts that we are to investigate in the following pages.

In order to understand the method and effect of the numerous remedies that have been proposed for the radical cure of Inguinal Hernia, it is necessary to be well acquainted with the anatomy of the parts, as well as with the mechanism and causes of this affection, and the changes it produces in the inguinal canal.

I shall therefore divide my subject into four parts: 1st, Anatomy of the inguinal canal, mechanism of the

production of hernia, &c. 2d, History of the operations for the radical cure, from the time of Celsus to the present century. 3d, Description of the operations that have been proposed to effect this purpose. 4th, An examination of those among them that seem to present any probability of fulfilling the terms of the question.

ANATOMY OF THE INGUINAL CANAL.

The inguinal canal is a passage formed in the parietes of the inguinal region, through which the spermatic cord in man, and the round ligament of the uterus in woman, pass out of the abdomen. It presents two orifices, and an intermediate canal; it differs slightly in the two sexes, but it will be sufficient for the present purpose to describe it as it appears in man.

The external or superficial orifice, called also the external ring, is of an oval or lozenge shape, having its long diameter oblique from above downwards, and from without inwards; its base corresponds to the interval, which separates the spine of the pubis from the symphysis.

It is formed by the separation of the fibres of the aponeurosis of the obliquus externus, which, near the pubis, divide into two bands, called pillars. The internal, thinner but broader than the external, descends obliquely before the symphysis pubis to insert itself to the spine and crest of the same side, as well

as to the inner half of the supra pubic ridge of the opposite side. It forms, in the internal angle of the ring of the opposite side, a triangular ligament, indicated by Winslow, but called Colles' triangular ligament.

The external pillar, which is also lower and slightly posterior to the internal pillar, is said by Astley Cooper to insert itself to the spine of the pubis; by Winslow, to the middle part of the symphysis, and even sometimes a little to the os pubis of the other side; and by Cruveilher, to the front of the symphysis.

This pillar is merely the inner portion of Poupart's ligament; from its lower edge a triangular aponeurosis, called Gimbernat's ligament, detaches itself, and is inserted to the crest of the pubis.

The separation of the two pillars forms a long, triangular-shaped opening; the external ring is completed by those fibres of the aponeurosis of the obliquus externus which take their origin from the anterior superior spinous process of the ilium, and, proceeding downwards in a curved line, the convexity of which is inwards, pass over the superior part of the ring, to be finally lost amidst the other fibres of the same aponeurosis.

The internal ring corresponds nearly to the middle of the space which separates the anterior superior spinous process of the ilium from the spine of the pubis. It is much less clearly defined than the external ring. It is of a semilunar shape, with its long axis perpendicular. Its internal border is falciform

and concave; and the external, straight and very slightly defined. It is closed by the peritoneum, which here forms what is called the external inguinal fossa. The epigastric artery passes by its lower and inner side.

The inguinal canal, which extends from the external to the abdominal ring, is about two inches in length. Its direction is from above downwards, from without inwards, and from behind forwards. It is essentially formed by the gutter made by the reflexion of the aponeurosis of the obliquus externus, which is continued in front with the aponeurosis of the obliquus internus, and behind with the fascia transversalis. It presents four walls, — a superior, formed by the borders of the obliquus internus and transversalis; an anterior, formed by the aponeurosis of the obliquus externus; an inferior, formed by the reflected gutter of the aponeurosis of the obliquus externus; a posterior, formed by the fascia transversalis.

The inguinal canal is traversed, throughout its entire length, by the spermatic cord, formed by the union of the vas deferens, the artery, veins, nerves, and lymphatics of the testicle: these elements, separated in the abdominal cavity, are united, as soon as they enter the canal, by the covering, more cellular than fibrous, which arises from the border of the internal ring.

MECHANISM, CAUSES, ETC., OF HERNIA.

The viscera contained in the abdominal cavity are submitted, on every side, to an almost continued pressure, from the action of the abdominal muscles. In addition, those viscera that are loose and floating tend downwards by their force of gravity; the action of the diaphragm is also exerted in the same direction. The inguinal canal, lying as it does at the lower part of the anterior walls of the abdomen, directly in front of the inclined plane formed by the alæ of the ilium, is peculiarly liable to be acted upon by the constant efforts made by the viscera to escape from the cavity of the abdomen. If, as is generally the case, this should be the weakest point of the abdominal walls, the internal ring is gradually dilated by the continued pressure upon it, until finally a portion of intestine or epiploön enters the canal, pushing before it the peritoneum. As the cause of the first displacement is continually in action, the viscera are gradually pushed deeper and deeper in the canal, until at last they emerge from the external ring, and, if nothing is opposed to its development, the hernia rapidly acquires an enormous size. This is by far the most usual method of the production of hernia; but it sometimes happens, that, from the action of some very violent exciting cause, the three periods are united in a single time, and the hernia appears at the external ring at the moment of its production.

The causes of hernia are either predisposing or

exciting. The predisposing causes are all those that have a tendency to diminish the resistance of the abdominal walls, to increase the volume, weight, or mobility of the contained parts, or to diminish the capacity of the abdominal cavity, — the viscera remaining of the normal size. Among the first are a debilitated constitution, weakness of the fibrous tissues, congenital largeness of the canal, ascites, pregnancy, old age, &c. In the second, hypertrophy of the viscera, from whatever cause produced; deposition of fat in the epiploön, &c. In the third, wearing corsets, tight pantaloons, &c. The exciting causes are all those that call into play the abdominal muscles, or which cause the viscera to strike violently against the internal ring. Among the first are lifting heavy weights, leaping, singing, &c.; certain diseases, as calcalus, constipation, asthma, &c. In the second, riding, dancing, leaping, &c. Generally, several causes act concurrently in the production of hernia. Some authors have gone so far as to assert, that a hernia cannot be formed in a person who is not predisposed to it; and this would seem to merit some consideration, when we reflect upon those cases cited by different authors, where a hernia being retained was followed by a second, and sometimes even a third and fourth.

Malgaigne establishes four degrees in inguinal hernia: 1st, Commencing hernia, where the hernia merely projects into the internal ring, and which he states to be rarely recognized by the surgeon. 2d, Interstitial hernia, where it occupies the canal. 3d, Bubonocele,

when it projects through the external ring. 4th, Oscheocele, when it has passed down into the scrotum.

It is generally divided into Incomplete hernia, before it appears at the external ring; and Complete hernia, after it has passed the external ring.

A common inguinal hernia presents itself as an indolent tumor, of a greater or less size, without change of color of the skin; becoming tense in the perpendicular position, and by the action of coughing; which can easily be pushed into the abdomen, but returns upon coughing, &c.

If we make an incision through the walls of this tumor, we find, in an incomplete hernia, — 1st, The skin; 2d, The superficial fascia; 3d, The aponeurosis of the obliquus externus; 4th, The cremaster; 5th, The fascia propria; 6th, The hernial sac. In a complete hernia, the coverings are the same, with the exception of the aponeurosis of the obliquus externus, which is replaced by the intercolumnar fascia, or rather by the fibrous covering of the spermatic cord, which arises from the borders of the external ring. The sac of a common inguinal hernia is transparent, and presents the same appearance as the peritoneum. The neck alone is more or less thickened: it may adhere externally to the surrounding parts or not. The spermatic cord is commonly situated behind the hernia, and can be felt as a separate body; but, if the hernia has existed for some time, the different elements of the cord may have been separated, and the hernia lie in the midst of them. The inguinal

canal is always more or less enlarged, and the increase in diameter is always attended with a proportionate shortening; so that, in a very old hernia, where the canal has attained its utmost limits of distension, the two orifices seem to make but one, and the canal has entirely disappeared. The external ring is rarely more than an inch in diameter. This change in the canal is effected by the pressure of the hernia, pulling down the internal orifice to a level with the external, and, as it were, destroying the posterior wall.

HISTORY OF THE RADICAL CURE OF INGUINAL HERNIA.

The first mention we find among surgical authors, of an attempt at the radical cure of inguinal hernia, is in Celsus (lib. 7, cap. 20): he speaks of the treatment of inguinal hernia as a thing generally known to the surgeons of the Alexandrian school, though he quotes no authorities on this subject. He did not operate on herniæ that were very voluminous, and recommends, before operating on young children, to try the effect of pressure, by means of a bandage and compress placed over the seat of the rupture, a method of treatment that he states to be frequently successful. His method of operating was either by ligature, suture, or excision of the sac, for which he gives two processes, according to the age of the patient: he did not extirpate the testicle in this operation, unless it was diseased, or adhered to the sac in such a manner

that it was impossible to excise the latter without so doing.

In the hundred and fifty years that followed Celsus to the time of Galen, we find nothing more on the subject. Galen himself, in his book *De Tumoribus præter Naturam* (lib. vi.), has added nothing to what was already known: he merely repeats the doctrines of Celsus. Leonides of Alexandria probably lived about the same time as Galen. We find, from some extracts of his works in Aetius (lib. iv. ser. 2, cap. 23), that he distinguished hernia with rupture of the peritoneum from hernia without rupture (Congenital hernia); and he considers the latter as more difficult to cure. In the two centuries that follow Galen to the time of Oribases, we find nothing more on this subject: he himself was a mere compiler from the earlier authors, and has added nothing new to what was already known. Aetius, in the fifth century (lib. iv. ser. 2, cap. 24), mentions cauterization for the first time: he prefers it to any other treatment, though he says that a radical cure may be effected by the use of astringents. We find nothing more till we come to Paulus, who lived in the seventh century, and who was the last of the Greek surgeons of any note: he gives the different operations as described by Celsus, only with more details: in the operation by excision, he recommended applying a ligature, previously, to the neck of the sac; a method he states to be more sure.

After Paul, the science of medicine in the West was overwhelmed in the universal wreck of the sciences

and of the arts, occasioned by the invasion of the northern barbarians. And it will be necessary to look for any further mention of this subject to the Arabian authors. From the prejudice they had against performing bloody operations, they confined themselves almost entirely to the use of plasters, and other topical applications; and, when an operation was thought necessary, they preferred the use of the actual cautery. John, son of Serapion, first taught that inguinal hernia arose from the dilatation of the canal through which pass the spermatic vessels; and he recommended cauterizing the part, in order, by the contraction of the cicatrix, to reduce the passage to its natural size. Albucasis, who lived in the first part of the twelfth century, recommended warmly the use of the actual cautery (lib. ii. fol. 67) in this complaint, as indeed he did in all other surgical diseases requiring an operation. He cauterized the inguinal region, in the direction of the canal, but forbade opening the sac.

Albucasis was the last of the Arabian physicians of any note; and, after him, it is necessary to turn again to the West. In the interval that separated the twelfth from the fourteenth century, surgery did but follow in the footsteps of the Arabs. It was at this time that the empirical treatment of inguinal hernia reached its height; and it is also from this period that the operation of castration became so prevalent as to excite the animadversion of the Pope. Fabricius ab Aquapendente (ed. of Paris, 1613, p. 274), speaking of the operation, says that Horace of Norcia, after having in a few years performed this operation

more than two hundred times, complained that he had not operated more than twenty times for a long while, which he attributed to the success of the topical applications made use of at that time.

Lanfranc, in 1296 (lib. 3, cap. 3, sec. 3), disapproves of cauterization and incision, and recommends topical applications: he, however, describes a method of cauterizing to the bone, after having first raised up the spermatic cord. Guy de Chauliac, in 1363 (Tractat 6, cap. 7), mentions all the different processes used in his time: most of them, however, are the same as those used by the ancient surgeons, more or less changed. Thus he mentions the section of the spermatic cord first tied at its upper part; castration; cauterization, both actual and potential, of the inguinal region to the bone; ligature of the cord, by means of a thread passed underneath it, tied over a small piece of wood, and tightened every day till the parts were divided; the method of cauterizing recommended by Lanfranc; the famous golden stitch, which he attributes to a certain Bernard Metis, &c. He preferred the potential cautery by means of repeated applications of arsenic: he mentions having seen his master, Petrus de Bonanti, perform the operation successfully more than thirty times. In the sixteenth century, Ambrose Paré (lib. 8, cap. 6, 7, 8) points out the evils of castration; he recommends the golden suture, and says he has known many cures effected by this operation. Fabricius de Aquapendente described the royal suture for the first time.

From the sixteenth century to the nineteenth, the

great majority of surgeons employed no other treatment, for the radical cure of inguinal hernia, than compression and rest; and it was during this period that Blegny (L'Art de Guerir des Hernies, Paris, 1676) invented the elastic truss. Fabricius de Hilden says, speaking of the treatment of this affection,—"Manifestum fit quietum et decubitum in dorso unicam esse panaceam herniarum." Some few surgeons, as Sharp, Schmucker, Henneman, Abernethy, Desault, &c., attempted to perform a modification of the royal suture, without any great success. Petit says that he was induced to perform the operation by incision much against his own inclination, and that one out of two patients fell a victim to the operation. In 1710, Hooper was sent to the galleys, for operating by castration; and a woman was publicly whipped at Rheims, for the same offence, in 1735.

Most surgeons will probably be astonished to learn that the operation for the cure of inguinal hernia by castration was still practised in France at the commencement of the nineteenth century; but such would seem to have been the case, at least when Sabbatier published his "Operative Surgery" in 1796; and in the report made to the Royal Society of Medicine, in 1779, by Poultier de la Salle and Vicq d'Azyr, the Chief of the Parisian Police states that a large number of the recruits inspected by him before entering the army, had lost one or both of their testicles by this operation; and the Bishop of St. Papoul found in his diocese that five hundred had been similarly mutilated.

In 1721, Freitag proposed to place a ligature on the sac, having first pierced it with a needle. In 1722, Mauchart recommended the scarification of the neck of the sac, an operation attributed to Leonides; and, in 1676, the still more singular operation of dilating the internal ring was proposed by Leblanc: these operations, however, did not produce a favorable impression. In 1773, the Academie Royale de Chirurgie unanimously condemned the method of cauterization by sulphuric acid, introduced into France by Little John, and for which he received £5,000 from George I. of England. It was this operation that caused the death of the celebrated Condamné. The Sociétés de Médecine, of Paris and Lyons formally prescribed the operation by the ligature, in 1812, when M. Martin published his work in favor of this method of treatment. I shall say nothing of the operations which have been proposed in the last few years, as they will be examined minutely hereafter.

REMEDIES THAT HAVE BEEN PROPOSED FOR THE RADICAL CURE OF INGUINAL HERNIA.

1. *Rest.* — The supine position has been recommended by many surgeons; among others, by Aetius, Avenzoar, Paré, Fabricius de Hilden, Ettmuller, Laporta, Reyne, Lombard, Begin, Sanson; and, lastly, M. Ravin (Archives, Gen. de Med., 1831, Sept.) has written an article expressly with the view of bringing this system into practice.

2. *Compression* is also one of the remedies that have come down to us from the time of Celsus. It was exercised at first by a bandage and compress, and, since the time of Blegny, by an elastic band, with a pad pressing upon the part. Aetius produced compression by means of a piece of wet paper, which was folded up several times on itself. Paré, Petit, Arnaud, and Lawrence have cured subjects advanced in age. The compression was sometimes sufficiently powerful to cause gangrene of the integument. Richter has seen it followed by inflammation and suppuration. Jean Louis Petit has seen gangrene caused by it; and, in a patient of Wilmer's, the death of the patient was the result.

3. *Medicinal application.* — Almost every substance used in medicine has in turn been proposed as a certain cure in inguinal hernia. The emplasticum contra rupturam of the ancients; the poultices of barley flour and beans, made with aloes, mastich, and Armenian bole, and the cataplasms of iron filings, with loadstone taken internally, of Ambrose Paré; the carbonate of ammonia of Belmas; the cerate of bricks of Fabricius; the bags of vinegar of Verduc; the sandal-wood, turpentine, and tormentilla of Mlle. Devaux; the famous remedy of the Prior of Cabriere, which consists in the internal use of muriatic acid, and the external application of red wine; and a thousand other substances, — have in turn been employed. But the following prescription, taken from Julius Cæsar Claudius, will give a better idea of the extent to which quackery was carried: —

℞ Terra sigil
Mummie
Sang drac.
Sang humani . . . . āā ʒvi
Bol. arm.
Litharge
Oppoponcis
Galba . . . . . āā ʒiiſs
Nucum cupressi
Nuci musci . . . . . āā ʒi
Moschi . . . . . ʒſs
Ros. rub. . . . . ʒij
Thuri . . . . . ʒſs
Cort. thuri . . . . ʒiij
Sarcollæ . . . . . ʒiiſs
Acaciæ
Balnas
Cortic gran consol, maie et min.
Sang hirci . . . . āā ʒi
Pil. lopori usti
Pellis ejusdem
Pilæ erici . . . . . āā ʒi
Gall tapsi barbati . . . ʒiſs
Picis Hispan.
Gummis elemi . . . . . āā ʒi
Mastich . . . . . ℥iſs
Consol mediæ . . . . ʒij
Gum Arab. . . . . ℥i
Tragac. . . . . ℥iſs
Gypsi
Sang vespertillii . . . āā ʒij
Myrti . . . . . ʒiij
Pici græcui . . . . ʒſs

M. et pul. pulveris ac gum in acete, dissolv. cum ol. abiet. Ft. ceratum.

4. *Incision.* — This was performed in the same way as the operation for strangulated hernia; the

different coverings of the sac were divided, the intestine reduced, and then the sac, having been opened its whole length, was made to suppurate, and the wound to heal by granulation. This operation has been performed as lately as 1832, when M. Larrey read before the Academie des Sciences, in his name and that of M. Boyer, an unfavorable report on a method, proposed by M. Bertrand, of incising the sac, and then filling its cavity with lint for the purpose of exciting inflammation. M. Serres and M. Dumeril, however, thought it might be of service occasionally. This operation has been recommended since Paré by Petit Lieutand and Leblanc, Arnaud, Acrel, Sharp, Richter, and Abernethy. They were, however, by no means successful in their practice. Acrel mentions one fatal case; Sharp, three; and Abernethy, several others.

5. *Excision.* — Celsus and Lanfranc practised the simple ablation of a disk comprising all the coverings of the hernia, including the sac. Bertrand dissected the sac, separated it entirely from the neighboring parts, and then excised it, after having opened it. Some surgeons incised the sac, and then excised the borders of the incision in the sac with scissors.

6. *Cauterization.* — The actual or potential cautery were used to produce the same effect. Albucasis, Avicennes, Roger, Brunnes, Theodoric, and Guy de Chauliac, preferred the actual cautery; Jean de Crepatis, André de Montpellier, and Pierre d'Orliat, the potential cautery. Albucasis made use of a circular disk of iron, an inch or an inch and a half in diameter; supporting, at equal distances, eight or ten little

projections, terminated by little balls: these were heated to redness, and applied to the integuments covering the tumor. Guy de Chauliac performed the operation in the following way: The patient having been placed on his back, with his pelvis raised, the hernia was reduced; then the surgeon, drawing towards the groin a large part of the relaxed peritoneal process, together with the spermatic cord, applied a potential cautery to the remainder of the sac; the size of the cautery depended upon the size of the hernia and the age of the patient. After the eschar was formed, the surgeon scarified it to the bone, and then made another application of caustic, in order to penetrate to the bone. After the second eschar was detached, the wound was made to cicatrize. Nicholas Godin applied the actual cautery, after having cut the flesh to the bone, in order to cause a loss of substance. Ambrose Paré recommends this treatment, if, as he says, "les patients le veulent." Avicennes speaks of surgeons, who, after having uncovered the hernia, raised up the sac without opening it, and cauterized the ring deeply with the actual cautery. Franco opened the sac, and touched the neck only with a small cautery. The cautery was sometimes applied all round the tumor, and sometimes directly over it. Boyer describes the process as follows: — The surgeon, having previously reduced the viscera, traced with ink on the integuments the shape of the tumor, and then applied the actual cautery, in the part circumscribed by the line, at intervals of a day, until the skin, cellular tissue, sac, and periosteum were destroyed, in order

that the bone having exfoliated, the cicatrix might adhere more strongly, and thus present a greater obstacle to the hernia; after the cauterization was finished, the wound was dressed with whatever was most proper to eliminate the eschar, and then made to cicatrize. If the potential cautery was chosen, they most commonly made use of the caustic potash, applied in a sufficient quantity to make an eschar of an inch in diameter over the external ring; when the eschar was eliminated, they destroyed the cellular tissue, and the greater part of the sac, with either arsenic, sulphuric acid, or corrosive sublimate joined to opium, avoiding as much as possible the spermatic cord. The wound resulting from this was treated in the same manner as in the method by the actual cautery.

7. *Ligature.* — This was either mediate or immediate. The constriction was either complete or gradual. It has been recommended by Paré, Heister, Schmucker, Freutag, Senff, Dessault, Saviard, and Sharp. The oldest practice consisted in applying a ligature over the whole of the integuments, so as to produce the mortification of all the parts comprised by the ligature. Celsus speaks of some who placed the integuments between two pieces of wood, and compressed them, until they became gangrened. Celsus himself practised this operation by traversing the covering near the abdominal ring with a double thread, which he tied on each side, either over the skin, or after having made an incision to the sac. Guy de Chauliac recommends uncovering the sac, in order to seize it more

surely near the origin. Paulus made a transverse incision in the integuments, before applying the ligature, and afterwards opened the sac to see that nothing was contained in it. Paré mentions the same method. Sormesius (de Lithomia, p. 209) mentions the following method, which, he says, was very successful among the Russians. The patient was placed upon his back and held by a sufficient number of robust assistants; then the surgeon made an incision with a scalpel, in the direction of the inguinal canal, of sufficient length, looked for the sac, opened it, and examined its interior; then, having reduced the projecting parts, he drew the sac, somewhat forcibly, out of the wound as far as possible, and then placed a ligature of strong thread round the neck; the edges of the wound were then brought together, leaving the ends of the ligature projecting: after the ligature came away, the wound was cicatrized. The practice of applying a ligature directly below the ring originated in the manner in which some surgeons, in the time of Roussel, practised the golden stitch. The integuments having been incised, the sac was raised up and separated from the cord; then a ligature passed between them, in such a manner as not to compress the cord. This operation has been attributed to Freutag. Thevenin traversed the sac with a double ligature, and strangulated the two halves separately. Petit, who slightly modified this proceeding, pretends to have found it very advantageous. Ledran advises this operation in inguinal hernia in women.

8. *Golden Stitch.* — This operation was designed

to save the testicle; but it probably failed to effect this, when it obliterated the hernial sac. Ambrose Paré gives three methods for performing this operation. First method: The surgeon, having made an incision above the os pubis, inserts a director, and pushes it entirely above the process of the peritoneum, raising up the process in order to separate it from its coverings, to which it adheres by certain nervous fibres. After having separated the process from the spermatic vessels and cremaster, he raises it up alone, taking up all that appears too much dilated, carefully, with a pair of flat pincers, pierced in the centre with a hole; then, holding the pincers firmly, he passes through the hole, near the spermatic cord, a needle armed with five or six threads. It is necessary to pass the needle a second time through all that remains of the process, and also through the lips of the wound; then make a tight knot, and leave the ligature hanging out of the wound. The ligature, rotting and cutting the parts, will fall out of itself. It must not be pulled, but left till nature has engendered sufficient flesh to fill up the wound. After the ligature has come away, the wound must be cleansed and cicatrized. Second method: Having exposed the process by making an incision above the os pubis, on the side of the hernia, to the peritoneum, pass a golden wire twice around it; then tighten it moderately in order to diminish the looseness of the process, without compressing the spermatic cord. The wire should be tightened every day for three days, by twisting it; then the ends are cut off

short, and bent up, so as not to hurt the part, and the wire is left in the wound, which is allowed to cicatrize. The patient should be kept on his back, with the pelvis raised higher than the head, for fifteen or twenty days. Third method: A lead wire is passed round the neck of the sac only once: it should be of the size of a small needle. It is then tightened as much as is necessary, — not too much, for fear of producing gangrene, nor yet too little, lest the hernia should return. The wire is to be left in the wound until this is entirely cured, with the exception of the spot where the ends of the wire project; then the wire should be carefully pulled out, and the whole wound will heal. When the canal is very much dilated, he recommends putting an additional ligature on the neck of the sac, above the leaden one, in the same manner as he describes the ligature in the first method.

9. *Suture.* — The sac was sewed up, either after having been incised, or the hernia was simply reduced, and the suture was made through the integuments at the same time. A modification of it was called the royal suture; because, according to Fabricius ab Aquapendente, it was destined to preserve subjects for the king. In this operation, he dissected down to the sac, separated it from the surrounding tissues its whole length, without injuring the cord, then sewed it up. Sharp proposes to sew the skin at the same time. M. Belmas, in his memoir on the radical cure of hernia (Rev. Med., 1838, Feb.), quotes the following method of performing this operation, from a

history of the Ottoman empire, by Lautemar: "Ils l'entreprennent sur toutes sortes de gens. Durant mon séjour à Constantinople, j'en fis l'epreuve sur mon sécretaire. Ils le lièrent sur une forte planche, ils ouvrirent le sac, reduiserent les parties sorties, puis firent une suture, en enlevant avec un razoir toute la portion du péritoine qui se trouvait au devant d'elle. Après quoi, ils couvrirent la plaie avec de la graisse du porc, y mirent le feu avec un fer rouge, et arrosèrent en suite les parties avec des blancs d'œufs. Le patient ne donnait plus aucun signe de vie; et quand il revint à lui, ce fut pour se plaindre de violentes douleurs dans le ventre," &c.

10. *Scarifications.* — The practice of scarifying the interior of the sac, attributed to Leonides, was brought into fashion by Freutag, and lately by Charriere and Manchart. The sac was first exposed, then lifted cautiously up, and the ring scarified in different places, — taking care not to injure the spermatic cord. Sometimes the incision was made into the sac, and the scarification was made on its inside. Leblanc maintained the benefit of a large dilatation of the ring, as in the operation for strangulated hernia.

11. *Castration.* — Paul made a T shaped incision on the anterior part of the scrotum: the first served for the ligature, and the second to extirpate the testicle. Franco commenced at the lower part of the scrotum, and dissected upwards. Heister describes the operation as follows: "The patient was placed on his back upon a table, the pelvis higher than the rest of the body, — either tied strongly, or held by a

sufficient number of assistants, to prevent him moving a limb. The surgeon, having reduced the hernia, ordered an assistant to compress the ring; then, having pulled up and to one side the anterior upper portion of the scrotum, incised the integuments, to the extent of three or four fingers' breadths, according to the size of the tumor. Having in this manner uncovered the sac, he separated it, together with the testicle, from the surrounding parts, and tore it from the scrotum, causing the most excruciating pain; then, pulling out as much of the sac as possible, he placed either a silken or hempen ligature upon it, — comprehending, at the same time, the spermatic vessels. Other surgeons separated the sac from the surrounding parts with the fingers, and, after having put a ligature on it, tore the testicle out of the scrotum with the other hand, — concealing it quickly, that the bystanders need not see it, — and then cut off quickly the testicle and the parts below the ligature; then, laying aside the testicle secretly, they filled the wound with lint, and covered it with a plaster; and lastly put the patient to bed, unaware of the loss of the testicle. The ligature was covered with vulnary balsam every day, until the ligature came away, which happened usually the fifth or seventh day. After the ligature had fallen, the wound was dressed with agglutinating balsams, and the patient kept quiet for twelve or fourteen days."

12. *Filling up the ring by the sac, &c.* — After the incision of the sac, if the hernia should be composed wholly or in part of epiploön, the ring can be stopped

up by a portion of it, retained in such a manner as to cause it to contract adherence with the ring. This has sometimes been performed after the operation of strangulated hernia. Cooper, Stevens, Velpeau, and Goyrand have all succeeded in this manner. Velpeau states, that, after the operation for strangulated entero-epiplocéle, the epiploön forms adherences behind the canal or in it, so as to form an obstacle to the reproduction of the hernia, whether the surgeon attempted to do so or not. The testicle has been used for the purpose of filling up the canal. In France, the testicle was pulled up into the ring, without incising the integuments, and a blister applied over it, in the hope of exciting adherence. In Albania, an incision is first made; the testicle, then exposed, is pushed directly into the canal. Garaugeot dissected the sac, and, then rolling it up, pushed it into the canal so as to stop it up. This method is, according to M. Velpeau, still recommended by Steffen.

13. *Graefes' operation, as described by Dr. Raw* (Berlin, Thesis, 1813). — The patient having been placed on his back, the hernia is reduced, and an incision made through the integuments, from half an inch above to an inch below the abdominal ring. The hernial sac is then dissected from the surrounding cellular tissue, raised up with a pair of forceps, and cut off with a scalpel. This having been done, a plug of lint, rubbed with some ointment or other, is introduced into the neck of the sac, so as not only to touch all parts of the internal ring, but even to project into the abdominal cavity. It is very important

that the plug should be adapted exactly to the circumference of the internal ring. One end of a string, sufficiently long, is attached to the plug, for the purpose of withdrawing it when necessary; and the other is fixed to the skin by a piece of sticking-plaster. The next morning, the plug is withdrawn. If it opposes any resistance, it is a symptom that inflammatory action has already commenced; and the operator should abstain from all treatment till it has completely ceased. In this case, the plug generally detaches itself from the wound in from three to four days, and should be immediately withdrawn. As soon as this can be effected, the important point is to introduce a second plug, in order to cause suppuration of the whole internal surface of the sac. In order to excite suppuration, it is well to smear the ends of the plug with simple ointment, and the middle with some more exciting, as, for example, red precipitate ointment. In a few days' time, the pus almost always becomes laudable, and granulations are perceived forming in the abdominal ring. As these granulations increase, the plug must be gradually diminished: it should be large enough to require a slight pressure to introduce it, without, however, any violence. After the granulations are fully formed, the plug is withdrawn, and the wound cicatrized. This result is frequently obtained in a month.

14. *Seton.* — Rattier (Rev. Méd. 1835, tom. ii. p. 404) penetrated into the canal by an incision practised directly over the external ring, then introduced a director, and made it project against the skin opposite the internal ring, and made a second incision in this

point; he then passed a seton of cotton threads through the two orifices. The threads were then pulled out, one by one, so as to diminish the volume slowly; and at the same time, by a moderate pressure, the adherence of the parts was encouraged.

15. Moesner (Medicinischer Correspondenz-blatt, 1845) gives the following method: — The operator raises the scrotum and the hernial sac, by means of a thread conveyed by a species of sonde-à-dard of his invention, consisting of a bent canula, terminated by a hollow ball of the size of a pea, mounted on a handle. He pushes up into the interior of the canula, by means of a suitably curved mandrin, a needle armed with a ligature, which he pushes through the olive-shaped button, through the invaginated skin of the scrotum, the inguinal canal, and the skin of the abdomen. Having then introduced the thread, with all necessary care, so as not to hurt the viscera, he leaves it in the wound, to act as a seton, and not to retain the invaginated integuments, as in Gerdy's method. The canal is then compressed, and the patient kept in bed eighteen or twenty days, which are sufficient generally to produce adhesive inflammation in the entire course of the seton; the thread is then withdrawn, and compression, by means of a truss, is continued for some weeks.

16. Mr. Gerdy has proposed the following operation. The instruments necessary for the operation are — 1st, a curved needle, pierced near its extremity with an eye, and mounted on a handle; 2d, six quills, or pieces of bougie; 3d, a bottle of concentrated am-

monia, and a camel's hair pencil; 4th, six double ligatures. The patient lying down upon his back, the operator places his left forefinger on the anterior and upper part of the scrotum, and pushes up the integuments to the ring, and as far as possible into the canal, leaving the spermatic cord behind; the needle, armed with a double ligature, is then directed on the forefinger to the bottom of this species of tunnel; and, by lowering the hand, the point is made to come out in front, traversing the invaginated integuments, the anterior wall of the sac, and the skin of the abdomen. As soon as the eye of the needle appears, the surgeon disengages one of the threads of the ligature, and withdraws the needle with the other end of the ligature still remaining; it is then passed in a second time, in such a manner as to come out about half an inch from the first, and the other extremity of the ligature disengaged. The invaginated portion of skin is then held in its place by the noose made by the ligature; the two threads of the ligature are then separated on each side, and tied over a piece of quill or bougie half an inch long, and then the first stitch of the suture is finished; two other stitches are then made in the same manner as the first, at half an inch distance on each side of the first. Then the surgeon dips the camel's hair pencil into the ammonia, and applies it repeatedly to the interior of the cavity made by the skin of the scrotum, until the epidermis is removed. The portion of skin thus denuded inflames and suppurates, and finally forms adherences on all sides. This takes place

ordinarily the sixth or seventh day. The stitches are then withdrawn, and the canal is obliterated.

17. Mr. Jameston, of Baltimore, operated on a woman affected with a crural hernia by an autoplastic operation. After having uncovered the ring, he dissected a flap two inches long and ten lines broad from the surrounding integuments, having its base next the first incision; then inverted it, and introduced the loose portion of it into the crural ring, and fixed it in this position by uniting the incision by means of a few stitches, and supported the whole by means of an appropriate bandage.

18. M. Leroy d'Etoille has recommended the following method (Rev. Med. 1836, tom. i. p. 271): The skin of the anterior part of the scrotum is pushed into the canal by means of a blunt metallic shaft, which passes obliquely through the pad of the truss, and can be moved by means of a screw. The skin is then denuded, as in Gerdy's operation. After the adherence begins to form, the metallic shaft is withdrawn, and compression applied for some time.

19. *Wutzer's operation.* — This operation, which is a modification of Gerdy's, is performed by the aid of an instrument called Celekleizon. The operator commences by pushing the skin of the scrotum into the inguinal canal, leaving the spermatic cord between the dorsal face of his finger and the posterior wall of the canal. He then slips along the palmar face of his finger a hollow wooden cylinder, longer than the canal, and pierced near its extremity with an opening which gives passage to a long movable needle contained in

the central cavity of the cylinder. He then pushes forward the needle, which, passing through the hole in the cylinder, pierces successively the anterior wall of the cutaneous infundibulum, of the sac, and of the inguinal canal. The point of the needle is then passed through a hole in another cylinder, and the two cylinders brought together by means of a screw passing through them near the external ring, in such a manner that the pressure is greatest near the needle. In this operation, the needle replaces the suture made in Gerdy's method; and, in addition, we have the pressure made by the two cylinders.

20. *Operation of Sotteau.*—The operator first invaginates the skin of the scrotum in the inguinal canal, and then pushes a curved needle through the skin into the inguinal canal, and then out through the skin again at some distance from the point where it was introduced. The point and the head of the needle both project beyond the skin. A piece of wood as large as the little finger, with a hole through its centre, is then passed over the needle, and fixed in its place by a pin passed through an eye in the needle near its point. A second piece of wood, similar to the first, is then placed on the opposite extremity of the needle, and the two are brought together by means of a nut upon the head of the needle, which has a thread cut on it. In order to avoid the trouble of turning the nut, and also to prevent irritation from the thread of the screw if it extended far down the needle, the operator places a wooden sphere between the small pieces of wood and the integuments. The danger of

passing a needle through the ring from without inwards, with nothing to direct its course, is evident. In order to avoid it, Sotteau has contrived the following instrument, composed, like that of Wutzer, of a wooden cylinder, with a mortice in its anterior extremity, and iron shaft at the other extremity, which is first perpendicular, and then bent horizontally in such a manner that it terminates on the same plane with the anterior extremity of the cylinder. A second shaft of straight steel, a sort of lever of the third order, is fixed to the extremity of the first shaft by means of a screw that allows only a lateral movement. At the end of this lever is a triangular opening for the purpose of receiving the head of a needle, which is firmly fixed by means of a small screw. The needle is bent, and represents exactly a segment of a circle of which the lever is the radius. In making use of this instrument, the skin of the scrotum is pushed into the inguinal canal, by means of the wooden cylinder, as in Wutzer's operation. The cylinder is then pressed against the anterior wall of the canal, in order to make the integuments tense; an assistant at the same time pressing his fingers on each side of the spot where the needle is to penetrate. The lever armed with the needle is now pressed down towards the skin. The point where the needle touches the integuments is the point where it should pierce them. The operator seizes it with the thumb and forefinger, and pushes it in the direction of its curvature: before the point presses from within outwards on the integuments, the assistant holds the

parts, so as to render them as tense as possible. As soon as the point of the needle projects half an inch, the needle is unscrewed from the lever, and the cylinder withdrawn. The rest of the operation is performed as described above. In order to render the adhesion of the parts more certain, the epidermis of the invaginated integuments may be removed by means of ammonia, before commencing the operation.

21. M. Haller, after having invaginated the skin of the scrotum, and placed two stitches, one as high as possible on the inner crus of Poupart's ligament, the other over the angle formed by the two crura, placed a ball of lint or cork in the loop formed by the thread; this was drawn up as far as possible into the canal, the two threads of the ligature separated, and tied over two pieces of quill held together by adhesive plaster. Ice was then applied to the seat of the operation, and the testicle supported. After suppuration had fairly commenced, the thread was drawn out, the lint or cork withdrawn, and a free exit permitted to the matter, — then compression applied for a suitable period.

22. *M. Belmas' First Operation.* — The instruments necessary are, 1st, a common lancet; 2d, two little blunt hooks, mounted on handles; 3d, a metallic canula, six inches long, and one eighth of an inch in diameter, forming a regular arc of a circle sixteen inches in diameter, and provided with a flat plate near the outer extremity to fix it; 4th, a stylet of the same curvature, terminated by a point like a trocar, and screwed on by the other end to a hollow metallic ring,

round which a little sphere, formed of goldbeater's skin, empty and sufficiently small to pass through the canula, is solidly fixed by a ligature; 5th, a common pair of forceps; 6th, a blowpipe in two pieces which screw together, and provided with a stop-cock, one end of which adapts itself to the metallic ring of the goldbeater's skin sphere, and the other has attached to it a similar sac full of air, which cannot escape except on turning the stop-cock.

Every thing having been prepared, the patient is placed on his back, with the pelvis slightly raised, and inclined to the side opposite to the hernia. The intestine is then reduced, and maintained by an assistant who exercises suitable pressure on the ring. The surgeon then rolls the sac between his thumb and finger to assure himself that it is completely empty, and makes a puncture through it, in the lowest part, with a lancet. The operator then introduces the canula through the incision into the sac, the assistant holding the lips apart with the blunt hook, and carries it carefully to the neck of the sac, and then, raising the integument opposite the ring, seizes the projection with the thumb and forefinger, and thus fixes the canula at the same time that he assures himself that there is nothing between it and the sac. An assistant then slips the stylet into the canula, the pointed extremity first; and, when it arrives at the sac, pushes it from within outwards through the sac and the integuments. As soon as it projects far enough, the operator seizes it with one hand, and pulls it out till the metallic ring of the goldbeater's

skin sphere appears, while with the other he withdraws the canula. The ring is then seized with the forceps, and the stylet removed, and the blowpipe screwed on in its place. As soon as this is done, the stop-cock is opened, and the air made to pass from the little bag outside into the one in the sac; then the stop-cock is again turned, and the outer half of the canula unscrewed. A proper compression is then applied, in order that the two sides of the sac may come into contact with the little ball of goldbeater's skin, and that the hernia may be retained in the abdomen. Twenty-four hours after the operation, the stop-cock is opened, and the air gently expelled. When the sac is supposed to have been completely emptied, which takes place ordinarily in from forty to forty-eight hours, the metallic ring is carefully pulled out, and a methodical and gradual compression applied for at least fifteen days.

23. *M. Belmas' Second Operation.* — Only one instrument is necessary for this operation, a species of stylet trocar formed of two small canulas, kept together by a steel mandrin, on one extremity of which a triangular point can be screwed. The corresponding extremities of the canulas are armed with little spur-like projections, which can be made to appear and disappear at pleasure.

To perform the operation, the operator transfixes the walls of the hernia, previously reduced, near the internal ring, with the stylet trocar; then, causing the spur-like processes to project into the canal, the stylet is withdrawn, and the two canulas separated

and pulled apart. Isolated from one another, they form two conductors, through which little dried filaments of gelatine, covered with goldbeater's skin, can be conveyed into any part of the sac. As soon as their introduction is terminated, the metallic spurs are made to disappear, and the canulas withdrawn. Pressure is to be applied, as in the first operation.

24. *Intro-retroversion.* — M. Signorini has proposed (Annal. Univ. de Med., April, 1839) the following operation. He divides it into five periods: 1st, The reduction of the hernia. 2d, The patient having been placed on his back, the operator, standing on the side of the hernia, places his forefinger on the base of the scrotum in front of the convexity of the testicle, and pushes up the integuments through the inguinal canal into the cavity of the abdomen. Then, lowering the extremity of his finger, and bending the last phalanx towards the exterior, he carries the summit of the species of tunnel formed by the invaginated integuments below Poupart's ligament into the crural ring; then, pushing it in the same direction through the crural canal, makes it emerge in front of the falciform process of the fascia lata under the integuments of the groin. 3d, The operator, holding his finger in the same position pushing against the skin of the groin, transfixes the lower and inner segment of the projection thus formed, with a curved needle, in such a manner as to make the needle come out near the femoral vessels, which an assistant protects from injury with his fingers; a second needle, such as is used in the operation of Chilissochisoraphy, is then passed

through the base of the cutaneous tunnel and the pillars of the ring. 4th, The operator withdraws his finger from the invaginated integuments, and, taking a scalpel in the right hand, makes an incision in the projection of the skin of the thigh, sufficiently deep to expose the skin that is invaginated and the falciform process of the fascia lata, in which he makes a few small incisions with the knife; a piece of thread is then wound round the needle, so as to complete the harelip suture. 5th, The tunnel made by the invaginated integuments is filled with balls of lint, the wound lightly dressed, and treated as if union by the second intention was desired. After the operation, the patient is placed in bed, the body in a supine position, the pelvis raised, and the thighs semiflexed, and the scrotum supported by a pillow. This position should be preserved, with the exception of the flexure of the thigh, which may be given up in a week, until the cicatrice is perfect and the hernia cured. If the ligatures should be too tight, they should be removed, and others applied in their place. The ligature should be removed on the fourth day, as well as the curved needle implanted in the integuments of the groin. As soon as suppuration commences, the ball of lint should be taken out, and another put in its place. The second needle is left till the seventh day, when it should be withdrawn. The inflammatory action should be closely watched, and not allowed to exceed what is necessary to produce adhesion. After the needles are withdrawn, great attention should be paid to preserve the invagination of the integuments by the more fre-

quent and careful introduction of the balls of lint, as well as by keeping the scrotum constantly supported.

25. *Angular Intro-retroversion.* — M. Signorini has more recently proposed the following modification of his first operation (Annal. Univ. de Med., Sept. 1844): —

The instruments necessary for the operation are several needles, and as many double ligatures, and a female catheter. The operation is divided into four periods: 1st, The operator, having reduced the hernia and placed the patient on his back, pushes the integuments of the scrotum with the forefinger of the right hand, through the inguinal canal into the abdomen; then, turning round the fallopian ligament, engages them in the crural ring of the same side, pushes them through the opening of the fascia lata, and fixes them in this position by a stitch of the harelip suture. 2d, The finger having been withdrawn from this position, the operator pushes with it the upper part of the outer edge of the fold of integuments under the fallopian ligament, as far as possible from the pubis, and fixes it by another stitch of the harelip suture. 3d, The finger being again withdrawn, the operator insinuates a female catheter in the fold of invaginated integuments, and pushes with it the superior and inner portion of the fold to the inside of the rectus muscle, and, making the instrument project as much as possible, makes another stitch in this point. 4th, The catheter having been withdrawn, a needle is passed through the outer and upper part of the pillars of the ring, through the invaginated integuments, and then out through the walls of the abdomen.

The patient is placed in bed, and pressure applied to the ring. The fourth day, the threads should be tightened. As soon as the skin is ulcerated by the pressure of the ligatures, they should be withdrawn, and the wounds cicatrized.

26. *Acupuncture.* — M. Malgaigne recommends piercing the canal several times with a needle, and then applying pressure to the parts. Pancoast states that the operation by acupuncture has been more or less practised in this country for the last fifteen or twenty years. It consists in making one or two rows of punctures through the skin and sac, with a common acupuncture needle, immediately below the orifice of the external ring. The operation was generally unsuccessful.

27. *Cold Douche.* — M. Verdier states that a harmless and efficacious method of obtaining the radical cure of inguinal hernia is the employment of oblique ascending douches of cold water. The treatment should last at least twenty days, during which time the douche is to be applied every morning, from sixteen to eighteen minutes, and about five hundred quarts of water employed. The first jet should be thrown slowly on the lower part of the abdomen, and then on the inguinal ring and canal.

28. *M. Bonnet's Operation.* — The instruments necessary for this operation are, 1st, three or four harelip pins; 2d, a number of small hemispherical pieces of cork; 3d, a pair of wire pliers. Before using the pins, they must each of them be passed through one of the pieces of cork; the flat side being pushed up

next the head, in order to increase the size. The hernia having been reduced, the operator seizes the base of the scrotum, as near as possible to the inguinal ring, and places the cord in the circle formed by his thumb and forefinger, which forcibly compress the part. He then thrusts one of the pins directly in front of his finger-nails, behind the coverings of the hernia, and near the suspensory ligament of the penis, through the parts, till the point appears in front, and the piece of cork placed next the head rests against the integument; he then passes the point through another piece of cork, the flat surface next the point, and pushes it till the parts between the two pieces are slightly compressed. In order to maintain the compression, the point of the pin is bent up with the pliers. Having thus placed the first pin, the cord is placed between it and the thumb and forefinger, and a second pin is then passed through the integuments, directly in front of the finger-nail, parallel to the first, about half an inch to the outside, and the point turned up in the same manner as the first. The cord is now placed between the two pins; but if, from the pressure of the hernia, the elements of the cord have been separated and cannot all be brought into the space included between the two pins, it will be necessary to place a third one about the same distance outside of the second, in order to confine the remaining portion of the cord. The pins should be withdrawn from the sixth to the twelfth day, when the inflammation is sufficiently active, and the heads commence to ulcerate the skin. In order to withdraw them, it is only

necessary to cut off one of the ends with a pair of cutting forceps. Three weeks to a month are sufficient to obliterate the passage.

29. *M. Mayor, of Lausanne, has proposed the following method:* — The surgeon, having prepared in advance as many needles threaded with double ligatures as he will want, and twice as many little balls of sponge, reduces the hernia, and assures himself of the fact by introducing the forefinger into the external ring. He then makes a line with ink in the direction of the canal, and extending from three to five lines above the ring to from five to fifteen below it. The operator then pinches up all the superabundant integuments in a longitudinal fold, the centre of which is formed by the inked line, and an assistant transfixes the centre of it with one of the needles; the end of the ligature is tied firmly to a piece of sponge; and the two ends, being separated at the opposite extremity, are tied over another piece of sponge in a bowknot, in order that the constriction may be increased or diminished. The number of ligatures depends upon the size of the hernia, and must be placed above and below the first, at the distance of about half an inch one from another: four are generally sufficient. The knots are then covered with carded cotton, and the fold of the integuments placed on the inside of the ring, then more cotton, and the whole covered with a compress and truss.

30. *Velpeau's Method of Scarifying the Canal.* — The forefinger is pushed into the inguinal canal, carrying the integuments before it. A sort of lance is

then introduced on the finger, which serves as a director, and thrust obliquely backwards and outwards into the iliac fossa. The finger is then withdrawn, and the edge of the instrument is turned against the walls of the iliac region, which are supported by the other hand, in such a manner as to scarify them in a multitude of points, in the outer, upper, and a little in the inner part, taking care to keep a certain distance from the epigastric artery. The instrument is then withdrawn, and the operation completed.

31. *Subcutaneous Scarifications by Guerin.* — The patient is placed in bed, with the thighs separated and semiflexed, and the pelvis and the upper part of the body lowered. The operator, having first reduced the hernia, raises up the integuments of the lower and inner part of the inguinal region and the base of the scrotum, in a transverse fold from below upwards. The surgeon then inserts a spear-pointed bistouri through the base of the fold of integuments into the canal above, and to the inside of the spermatic cord, which an assistant holds carefully outwards and downwards. Through the opening thus made, he inserts a blunt-pointed convex tenotomy knife, the blade of which is an inch long, and a line and a half wide, with a heel half an inch long. The blade having been inserted nearly as far as the abdominal ring, he cuts obliquely from behind forwards, and from within outwards, to the depth of a third of an inch, having first ascertained that the cord is properly held by the assistant. Then, turning the blade of the knife, he cuts successively above and below, in the internal

angle of the ring near the pubis, the tense fibres formed by the division of the fallopian ligament, and the fibres of the obliquus externus that insert themselves there. Lastly, he makes several superficial scarifications in the course of the canal, in the part intermediate to the principal incisions. These different incisions, though they should be at least a third of an inch in depth, and occupy a part of the canal, should only divide the fibres of the obliquus externus, and are consequently limited to the superficial plan of the canal, and to the external ring.

32. *Velpeau's Operation by Injection* (L'Esculape, No. 41). — The operator makes an incision, about an inch long, through the integuments; and then, having punctured the sac with the point of a bistouri, introduces a canula through the orifice by means of a probe. Then, holding the edges of the puncture against the canula with a pair of forceps, an assistant injects a mixture of tinct. iod. ʒvi. aqua distil. ℥iij.; whilst a second assistant compresses the inguinal canal, to prevent the injection from entering the cavity of the abdomen. After the injection has been made to touch every part of the sac, it is allowed to run out through the canula; and, this being withdrawn, the wound is closed with three stitches of harelip suture.

33. *Pancoast's Operation by Injection.* — The apparatus required is a minute trocar and canula; a small graduated syringe, capable of containing a drachm of liquid, well fitted to the end of the canula; and a good fitting truss for the purpose of making compression. The patient is placed on his back, the viscera

are then to be reduced, and the truss applied over the external ring, for the purpose of keeping them up, as well as to prevent the possibility of the small quantity of fluid thrown in from getting into the cavity of the abdomen. The surgeon then presses with the finger at the external ring, so as to displace the cord inwards, and bring the pulpy end of the finger on the spine of the pubis. At the outer side of the finger, he now enters with a drilling motion the trocar and canula, till he feels the point strike the horizontal portion of the pubis, just to the inner side of the spine of that bone. The point is then to be slightly retracted, and turned upwards and downwards. The instrument is then to be further introduced, till the point moves freely in all directions, showing it to be fairly lodged in the cavity of the sac. The point of the instrument should now be turned into the inguinal canal, for the purpose of scarifying freely the inner surface of the upper part of the sac, as well as that just below the internal ring. The trocar is now to be withdrawn; and the surgeon, again ascertaining that the canula has not been displaced from the cavity of the sac, throws in, slowly and cautiously, with the syringe, which should be held nearly vertical, half a drachm of Lugol's solution of iodine, or half a drachm of the tincture of cantharides, which should be lodged as nearly as may be at the orifice of the external ring. The canula is now to be removed, and the operation is completed. A compress should be laid above the upper margin of the external ring, pressed down firmly with the finger, and the truss slid down upon

it. The patient is to be kept from changing his position during the application of the truss, and should be confined for a week or ten days to his bed, with his thighs and thorax flexed; keeping up steadily as much pressure with the truss as can be borne, without increasing the pain, in order to prevent the viscera from descending and breaking up the new adhesions, while they are yet in the forming state, or avoiding the risk of their becoming strangulated, or being rendered irreducible by the lymph effused into the cavity of the sac.

RESULTS OF THE DIFFERENT OPERATIONS.

To effect the radical cure of inguinal hernia, one of two indications must be fulfilled: either a restoration of the canal and the orifice to the normal state, or the obliteration of this outlet of the abdominal cavity.

The remedies used to effect the first of these indications are rest, compression, and topical applications. The first of these, though very generally used as an adjunct to other means, has been rarely recommended alone. Lately, M. Ravin (loc. cit.) has published a memoir on this method, employed, it is true, in connection with other means, but in which this is stated to be the principal agent in effecting the cure. He gives, in support of his method, nine cases, some of which were entirely cured, one probably so, and one in which a cure was not effected. He states the ordinary duration of the treatment to be from one to two

months, but mentions one case where the treatment was continued six months. M. Biagnini (Bullet. delle Scienze Med., Janv. 1840) comes to the following conclusion, in regard to this method of treatment: — 1st, That it is possible to obtain the radical cure of hernia by the horizontal position long continued. 2d, That the cure takes place in consequence of the diminution of the diameter of the canal, and the restoration of its obliquity, by the tonic power of the tissues. 3d, That the person must be possessed of considerable vital energy, which would prevent old persons from deriving any benefit from this system. And, lastly, that it is inapplicable to cases of old hernia, where the canal is reduced to a mere ring. The duration of the treatment, which may last a year, would prevent the method, even if certain in its effects, from ever being generally applied to adults. The system of strong pressure, which, however, acts from exciting an adhesive inflammation and then obliterating the passage, recommended by some authors, has long ago been given up, in consequence of its dangerous effects, as well as the uncertainty of its action, though it has been revived from time to time. The report of the Philadelphia Committee condemns, in decided terms, the trusses of Messrs. Stauger and Wood, which were constructed on this principle, and furnished with blocks of wood, lead, and iron, exerting a strong pressure, with the view of exciting inflammation and adhesion. Compression by means of an elastic truss, such as is commonly used, as a palliative remedy for the disease, is sometimes productive of a radical cure. The report

already mentioned speaks in high terms of the efficacy of the truss invented by Dr. Chase, though probably the cases which were exhibited to them were the most favorable. M. Malgaigne expresses the opinion, that all hernias could be cured, if a proper degree of attention were paid to the construction of the truss. Experience thus far has taught, that pressure, as a means of effecting the radical cure of inguinal hernia, is very uncertain in its effect, and that it cannot be relied upon except in children: the effects of pressure from ill-fitting trusses are very evident. M. Malgaigne states, that sixty-five out of two hundred cases, examined at the Bureau Central in Paris, had some affection of the cord or testicle. Topical applications were much employed at one period; but they are now recognized as being without efficacy in the treatment of hernia. M. Jules Lafond exhibited quite lately, at the *Institute* of France, several patients cured radically by his medicated pads; but the Committee appointed to investigate the subject attributed the cure to the compression used, and not to the medicinal qualities of the pads. I have been unable to find any cases treated by the cold douche, recommended by M. Verdier; but I have no hesitation in asserting, that, employed as a principal means of cure, it would be found utterly ineffectual.

Among the different operations that have been proposed to effect the radical cure of inguinal hernia, by the obliteration of the passage through which the hernia passes out of the abdomen, by far the greater number have already been blotted out from the practice

of surgery; and I have given a description of them, only as Dionis says, "that we may know what foolish things our ancestors did." It will be necessary for me to examine only those comparatively modern operations, which have as yet scarcely found their true level in the science of operative surgery.

These operations may be divided into two classes: 1st, Operations that are intended to obliterate the passage by exciting an adhesive inflammation, and thus, as it were, gluing its walls together. 2d, Operations which act by stopping up the canal by a sort of organic plug. Among the first are Graefe's operation; the operation by seton of Rattier and Moesner; Bonnet's operation, and the modification of it by Mayor; Guerin's and Velpeau's subcutaneous scarifications; Velpeau's and Pancoast's operation by injection; and Belmas' two operations. Among the second, Jameston's and Jackson's autoplastic operation; Gerdy's operation, with the different modifications that have been made in it, including Signorini's two operations.

That a process so barbarous and unscientific as that of Graefe should be recommended by such an illustrious surgeon, and at so late a date, seems hardly credible; yet the illustrious author, in describing it, uses the most flattering language: "Methodum operationis hic descriptam, ab auctore observatam, feliceterque adhibitam ante plures abhinc annos tanto cum successu exercui ut, munus in alma nostra musarum sede tribus fere annis elapsis auspicatus illam in prælectionibus publici auditoribus tradere sum commotus." Dr. Raw (Thes. cit.) mentions four cases operated on

by this method: The first that of a widow forty-six years of age, cured in twelve days; the second, a young man thirteen years old, cured in twenty-two days; the third, a man of forty, also cured; and the fourth, a woman seventy-eight years old, treated with equal success. It is hardly necessary to state that this operation is most unjustifiable, and one that must prove dangerous in its results; and it is difficult to conceive of so much good luck, as the inventor must have had, to have not only excited a violent inflammation of the neck of the sac, but also of the adjacent peritoneum, without causing a fatal peritonitis.

Rattier's operation, for the radical cure, by means of a seton, has not, as far as I am aware, ever been performed on the living subject. Moesner has operated successfully on four patients by his method. He gives no account of the symptoms presented by the patient after the operation, but states that the cure still maintained itself after the lapse of a year. Of the two operations by seton, that of Moesner is by far the most ingenious and scientific, though evidently taken from Gerdy's operation by invagination. This method of treating hernia, although successful in the four cases given by the author, is one, that, judging from the ill effects produced by the operation for congenital hydrocele by the seton, could not be recommended, without it should have been found successful in a much larger number of cases than M. Moesner has given.

M. Bonnet, having frequently performed M. Duval's operation for varicose veins successfully, was led by

the consideration, that two diseases presenting the same indications can be cured by the same means, to attempt his operation for the radical cure of hernia. In the first operation performed by him, he pierced the sac with eight pins, which he attempted to maintain by the aid of a compress and spica bandage firmly applied. On removing the bandage, three days after the operation, he found that all the pins had fallen out, and were lying between the compress and the integuments. In the subsequent operation, he adopted the system of increasing the size of the heads of the pins by the pieces of cork, and rendering them immovable by twisting up the points. Only nine patients have been operated on by him (Gazette Medicale, December, 1837): of these, the first, an old man, was only relieved for the moment. Three adults, with very voluminous herniæ, and whose inguinal canal had become direct and sufficiently large to admit several fingers, were operated on without the slightest success. It was perfectly successful in those adults where the hernia was of the size of the fist, and the inguinal canal, still oblique, only admitted the forefinger; and one child, ten years of age, was perfectly cured, although, from the size of the hernia, and the diameter and direction of the canal, he presented the most unfavorable prospect. Not a single symptom of any severity exhibited itself in any of the cases operated on. A slight pain in the part where the needles were placed, which soon passed off; and, three or four days after the operation, a little reaction, produced by the ulceration of the integu-

ments by the pins, which was completely dissipated by their removal. In one case of very large hernia, a singular phenomenon presented itself. The sac became filled with serum, and almost as large as before the operation. Bonnet, in the memoir he read before the Academy, comes to the following conclusions in regard to his operation: 1st, The operation ought not to be attempted on old people. 2d, That it does not afford any chance of durable success in adults, when the hernia is very voluminous. 3d, That in adults, where the hernia is small, and the canal still oblique and of small diameter, the operation can be performed with great success; and that it is equally successful in children, whatever is the size of the hernia, or the state of the canal.

M. Mayor has been constantly occupied in attempting to simplify surgical operations and dressings, and his operation can be considered as nearly identical with that of M. Bonnet: it only differs from it in the fold of integuments being raised up in a line with the axis of the canal, instead of being transversal, and in his not transfixing the sac, as M. Bonnet proposed to do. The last indication, however, I consider as merely theoretical; as, if the sac were adherent to the surrounding parts, it would inevitably be traversed by the needles in either operation, and, if it were not, it would probably be reduced with the viscera, and thus escape their action.

M. Mayor has operated in seven cases. Of these, one was an umbilical, and one a crural hernia. Six of them were cured. The symptoms presented after

the operation were generally insignificant; but, in one case, the great swelling, abscess, and febrile symptoms compelled him to remove the ligatures on the fifth day after the operation. The hernia reappeared below the last ligature; another stitch was made in this point, the success of which is not stated. The unsuccessful case was that of an old man, eighty-six years of age, who had had a hernia for three years, which could not be kept reduced in consequence of a violent cough. Four points of suture were applied; but the patient was unable to bear any compression, and the hernia soon reappeared under the last stitch. It could, however, be retained by a suitable bandage after the operation. M. Mayor gives the following explanation of the mechanism of the radical cure by his system: 1st, The strong tension of the skin over the opening through which passes the hernia closes it, at least for a time, and opposes energetically a renewal of the hernia. 2d, The immediate swelling of the subcutaneous fatty tissue takes an active part in the process of cure: it swells up, and, as it cannot develop itself towards the skin, it is obliged to take the direction of the ring to fill the opening, and, lastly, to contract adherences with the adjacent parts. 3d, The inflammatory swelling which takes place in the part near the ring, and in the ring itself, causes adhesive inflammation of these parts. 4th, A secretion of plastic lymph, which unites all the parts together. 5th, The thickening and solidification of the same lymph.

M. Belmas, having made some experiments with

little hollow spheres of goldbeater's skin, placed in contact with the peritoneum of animals, with the intention of exciting an exudation of plastic lymph and then to withdraw them, found that the little vesicles became gradually softened and swollen by the absorption of serum; and that, if examined twenty-four hours after the operation, they adhered strongly to the surrounding parts. If they were torn from the surface of the peritoneum, they seemed to be held down by an infinite number of little threads, which were elongated, and finally broken, by the force applied to effect that purpose. On examining the little spheres, it was found that the air contained in their cavity had disappeared; and that, in its place, there was at first a quantity of limpid, and later of troubled serum, and finally a multitude of little albuminous filaments, whose number increased from day to day. The walls of the sphere itself became softened by the serum, and then reduced to a species of pulp, and finally absorbed. Three months after the introduction of the vesicle, nothing was found but a species of fibrous nucleus, without any trace of inflammation or adhesion in the peritoneum surrounding it. Thinking that the same effect could be produced in the hernial sac, he experimented on thirty dogs afflicted with hernia, and found that the sac was always diminished in size, and in a great many instances it was obliterated; and that in no one instance was there any symptom of peritonitis. Having thus assured himself of the effect upon animals, he made four trials with it upon different individuals. The

first case was perfectly successful. In the second case, a congenital hernia, the ring not being properly compressed, the testicle remounted into the abdomen, carrying with it the vesicle and a long piece of silk, and brought on intense fever, nervous symptoms, pain above the hernial sac, distension of the hernial sac by a milky serum that flowed from the opening in the sac for a long time after the disappearance of these symptoms, absence of the testicle in the scrotum, an intimate adhesion of the tunica vaginalis; opposite the ring was a swelling that seemed to be produced by the testicle; and above, a hard nucleus, deep seated, and pretty large, caused by the vesicle and silken ligature carried into the cavity of the abdomen. The third attempt was made on an umbilical hernia: in this case, the vesicle was withdrawn immediately; but the introduction of it had caused an inflammation, that produced the obliteration of the sac. The fourth attempt was made on an old man, who had a double hernia. In this case, no sooner was the incision made than the patient became restive, and it was with great difficulty that a small vesicle was placed in contact with the ring. Every thing seemed to be going on well, when he was attacked by an erysipelatous inflammation, and died. The peritoneum was perfectly normal. The ill success attending these operations induced M. Belmas to make trial of his second method of operating. Ten patients have been operated on by that process; two out of the number left the neighborhood, but represented themselves as cured. In three other cases, the success was perfect. In three

others, the neck of the sac was obliterated; but, the ring not having been compressed for a sufficient length of time, the obliterated point has been pushed down by the intestines, and a new hernia produced. The bandages have been re-applied, and the return of the ring to its normal condition is such as promises a decided cure. The two remaining individuals were obliged to lay aside their bandages too soon, in consequence of the pain produced by them. The herniæ have re-appeared as before the operation; but the patients are desirous of a second operation.

M. Velpeau (Bulletin de Therap., August, 1840) was led to attempt his subcutaneous operation, from the confidence he placed in scarifying the ring as a means of exciting inflammation, and which he had renounced only from its danger when combined with a free incision, and from the hint given by M. Guerin, who, in his memoir on the innocuity of puncturing large cavities by the subcutaneous method, states that he desires to attempt this method as a cure for hernia. One patient only has been operated on by M. Velpeau. After the operation, which lasted but a few minutes, and caused the loss of only a few drops of blood, the patient was placed in bed. No inflammatory symptom manifested itself, and the little puncture was cicatrized the next day. A truss was applied the third day, and the patient commenced working. Encouraged by this result, he desired to be operated upon for a second hernia, which was done ten days after the first, and with as simple a result. Since this time, the patient has been employed as cook at the hospital,

and is perfectly cured. Although the first hint of the operation was given by Guerin, still he did not attempt it till nearly three years after the operation by Velpeau. The patient operated on by him had also a double hernia. The one operated on, the right, appeared seventeen years before the operation, three years after the one on the left side, and was occasioned by a violent effort: it was about the size of an egg, and descended half-way down the scrotum. The canal was still oblique, and scarcely admitted the forefinger; the orifice remained dilated, with its walls slightly tense after the reduction of the hernia. The operation lasted ten minutes, and about four ounces of blood were lost; after the expulsion of the air and a part of the blood contained in the wound, the opening was closed, and compression applied by means of a spica bandage. The operation was not followed by the slightest unfavorable symptom. The patient slept well, and the wound cicatrized almost immediately. A week after the operation, there was no trace of the external wound, neither redness nor sensibility in the course of the canal, which was the seat of an effusion of lymph already consistent. The compression and the recumbent posture was continued a week longer, at which time the substance effused was transformed into an almost fibrous knotty tissue, which seemed already sufficiently strong to prevent the protrusion of the hernia. The patient's making an effort sufficiently strong to cause the descent of the left hernia had no effect on the side operated on. At the end of the third week, the patient was allowed to rise, still wearing a

bandage. He commenced working at the time, and soon left off his bandage. After working daily for six weeks without his bandage, he presented the following symptoms: All the right iliac region, as well as the groin of the same side, is less prominent than the corresponding parts of the opposite side. The inguinal canal is obliterated. When he makes any effort, the viscera can be felt pushing against the abdominal walls, about two inches above and to the outside of the canal. The skin which covers the seat of the operation has preserved all its mobility.

The operation of injection was first practised by Desault, who tried it on a case of congenital hernia, but without any success, as, after the inflammation and swelling occasioned by the operation had subsided, the hernia returned. Velpeau has since (Medicine Operatoire, 2d edit. vol. iv. p. 45) recommended the same operation. He was induced to try it from having observed that the treatment of congenital hydrocele by injection was little, if any, more dangerous than that of common hydrocele. He has operated on three patients, neither of whom presented any serious symptom after the operation. Three months after the operation, two of them appeared to be perfectly cured; the third had not entirely recovered from the effects of the operation, at the time the account of it was published.

Pancoast (Oper. Surg., p. 283) gives thirteen cases. Only one of them presented any symptom of peritoneal inflammation, and in this case it was easily subdued by the application of leeches. In several instances a sin-

gle operation was sufficient. In others, where the sac was larger, or the patient less careful in keeping the truss applied, or from a cautiousness in introducing, in the first case, a more limited amount of liquid, the effect was merely to narrow the sac, rendering a repetition of the process necessary for the cure. M. Pancoast says that he cannot state any thing with regard to the permanency of the cure, as the patients were lost sight of after three months; but that, for this period, they were employed as laborers on a farm, and did not exhibit any symptom of a return of the disease. The operation by injection has been performed frequently in this city. The method is the same (as far as I have been able to ascertain) as that employed by Pancoast, with the exception that the canula and syringe, together with the trocar, form one instrument. I have been able to ascertain the particulars of eight operations. In none of them was there any symptom of importance after the operation. These operations were performed from one to three years ago. All the patients state that their condition has been benefited by the operation, though only two are cured; among the latter is one cure of many years' standing in a man over sixty years of age.

The statement of patients under such circumstances is, of course, to be received with reservation. In one of the two patients mentioned as cured, the writer has been able to satisfy himself that the amelioration was real; with regard to the other patients, the writer has such evidence as he believes to justify him in the statement he has made.

M. Gerdy probably derived the idea of his operation from the cases mentioned by Arnaud, wherein, during the reduction of an inguinal hernia, a fold of skin was carried up into the ring, and retained, adhesion took place, and the two patients were radically cured. M. Gerdy is said to have operated himself more than thirty times, and with great success. I have been able to find only sixty-six cases in which the results are stated. Of these, twenty-two only are by Gerdy; seven are by M. Haller, who makes a slight modification in the operation, but not enough to separate it from Gerdy's; eleven by Sotteau, and four by Wutzer, who have also made a slight alteration in the manual of the operation; four by Poumet; five by Ducros; five by Ranz; two by Regnoli; three by Ledrun; and one each by Roux, Bransby Cooper, and Velpeau. M. Gimelle made the following report to the Academie de Medicine on the first eleven patients operated on by Gerdy, including one by Velpeau: A fatal result was occasioned in one instance by a pleurisy, produced by the cold applications made with a view of preventing the inflammation from becoming excessive; the hernia re-appeared in three instances; five were cured; one is yet under treatment; and the other, who had a congenital hernia, had an enormous erysipelas of the scrotum, and a vast abscess of the iliac fossa, but was finally cured. Gerdy acknowledges three other fatal cases, — one from a disease of the heart, which would not have been operated on, if the patient had not concealed the fact; another, operated on by Huguier, and who is included in the four

cases given by Poumet, died of an abscess situated between the obliquus externus and obliquus internus muscles; the other died at a Maison de Santé, and I have not been able to find any account of the cause of his death. Dr. Ranz (Gaz. Tosc. della Sci. Med., May, 1845) gives five cases operated on by himself, and two others by Dr. Regnoli, seven years ago. The hernia has returned in every instance, though the persons operated upon have never discontinued the use of a truss. Dr. Ranz attributes the want of success in his operation — which did not, however, present any dangerous symptoms — to three causes: 1st, That, in invaginating the skin of the scrotum in the inguinal canal, the sac of the hernia separates itself from the integuments, which then pass between it and the walls of the canal. 2d, That the invagination does not stop up the whole canal, being fixed by the ligature only to the anterior wall, — the whole posterior half remains open. 3d, That the invaginated portion of the integument returns to its place, and the effused lymph is soon absorbed.

Bransby Cooper (Med. Chirug., January, 1841) operated on one case unsuccessfully; though, after the operation, the hernia was much more easily retained than before the operation. Dr. Haller (Oester Med. Jahrbuchen, March, 1842) gives seven cases, three of which were successful. The termination of the four other cases is not given, but was probably unsuccessful. Professor Wutzer (Bon. Org. Furdie Gesam. Hiel, 1842) gives four cases. Of these, one was successful; another, a case of double hernia, was cured of one

hernia, on the other side the canal was only obliterated inferiorly, and the patient continued to wear a bandage as a precaution. The third case was a man affected with sycosis, lichen, and a stricture of the urethra: the operation was unsuccessful, as, each time the invaginated integument was left to itself, it slipped out of the canal. The fourth was perfectly successful. M. Sedillot (Medicine Operatoire, p.) has operated in three cases. The first, on a man forty years of age, was unsuccessful. The second, a medical student, was cured for five months; at which period the hernia re-appeared in consequence of his falling down a flight of steps. The third case was a young child: his cries caused the hernia to re-appear, notwithstanding the obstacle opposed by the ligatures, which were removed two hours after the operation. A purulent peritonitis carried off the child, forty-eight hours after the operation; although it was ascertained, at the examination of the body, that none of the viscera had been wounded. Sotteau's eleven cases are all given as cases of success; but, as they were not seen after they left the hospital, the probability is that the greater number relapsed. Dr. Signini of Vienna (Huff. Jour. Prat. Heilkunde, March, 1841) does not give any cases, but states that he has seen a good many, and that in some it had occasioned death, in others inflammation of the peritoneum, in others there was no cure.

The first patient operated on by M. Signorini presented no symptom of any consequence after the operation. Examined by a committee of physicians,

the hernia was pronounced radically cured. The patient was able to make a strong effort, without disturbing in the least the invaginated integuments, although the pressure of the viscera could be felt against the walls of the abdomen. The second patient experienced the first day a sensation of heat in the part, which yielded to cold applications. The second day, pain in the direction of the cord, and reaching the testicle. The third day, a little pain in the abdomen. The fifth day, there was a little traumatic fever, which was easily dissipated by bleeding and purgation. From the eighth day, no more untoward symptoms presented themselves. Suppuration commenced on the ninth day, and the needle came away soon after. On the fourteenth day, all the wounds formed by the needles were in process of cicatrization, and the cure was completed on the 21st of June. It is not stated, in the description of the case, on what date the operation was performed. A committee appointed to examine the patient, the 27th of January, stated that the inguinal canal was obliterated by the invaginated integuments in the inner and lower part, and that it was still open in the upper and outer portion; a disposition which, while it was unfavorable to the protrusion of the hernia, required a truss to prevent its possible reproduction through the upper half of the canal.

Petrali, in his memoir, gives seven cases operated on by Signorini's method, including the patient whose case is described above. These were all unsuccessful. In Signorini's first case, the hernia re-appeared a year

after he was examined by the committee. In two of the cases, a double hernia in the same individual, the hernia re-appeared on the right side in a year, and, in another year, the left hernia, though still very small, had already passed beyond the cicatrix; the remaining cases all relapsed after a shorter or longer period of apparent radical cure.

The result which I have given of the different modern operations for the radical cure of inguinal hernia is the best criterion of their safety and success. It must, however, be borne in mind, that the occasional fatal cases occurred in hospital practice, and more especially in the large hospitals of the European cities, where the mortality from all operations is incomparably greater than in a more healthy atmosphere. Of the fatal cases, one only, the child operated on by M. Sedillot, died of peritonitis. Judging both *à priori* and from the cases on record, I should say that the danger of any of the operations proposed, with the exception of Graefe's, the seton and Signorini's, which can hardly be said to be an operation for *common* inguinal hernia, is as little as in any of the other minor operations of surgery, as in hydrocele for example. One hundred and forty cases in all have been operated on by the different methods: of these only three proved fatal from the effects of the operation; two by Gerdy's operation, and one by Belmas'. Of the success of the operations I cannot say so much: most of them have already been given up by their inventors. During two years' residence in Paris, I did not see or hear of more than one case of hernia operated on for the radical

cure. Bonnet's and Mayor's operations, even if successful, only change a complete into an incomplete hernia. Mayor, who was much pleased at first with the success of his operation, has since given it up (Gaz. Med., p. 410, 1837); and it is probable that Bonnet has done the same. Those of Belmas and Gerdy are conceived in a more scientific spirit. Of these, Belmas' second operation appears to have been the most successful; but the complicated apparatus necessary for its performance is a sufficient objection against it. Gerdy's operation is, without doubt, the most rational; but experience has taught that it is impossible to prevent the invaginated integuments from slipping out of the canal. In the few instances of permanent success by this method, the cure was occasioned by the inflammation developed by the ligatures, — inflammation which can be more easily and more securely excited in other ways. Besides its uncertainty, this method has been, thus far, the most dangerous, two patients at least having lost their lives in consequence of it. The operation by injection seems to offer a sufficient guaranty of success at first sight; but M. Velpeau has given it up, in consequence of the difficulty of getting into the sac. In one of the three cases operated on by him, he found at the autopsy of the patient, who died of a disease of the heart, that there was no adherence in the cavity of the sac.

Pancoast has also, I imagine, renounced the operation, as he states that the cases given by him occurred seven years ago. Still this method appears to be far preferable to any of the preceding ones. Some of the

patients were cured, and all benefited, by the operation; and out of twenty-four cases, which I have collected, not one has proved fatal.

The last operation which we have to consider is the subcutaneous scarifications of Guerin and Velpeau. The two do not differ sufficiently, in their principle or application, to render it necessary to separate the results. (Vide the memoir on subcutaneous incision of the knee-joint, by Goyraud, Gaz. des Hospitaux, May 1842; and Maladies des Articulations, par Bonnet, vol. i. p. 451.) From the immunity attendant upon subcutaneous section in other parts, and from the consideration of the remarkable mildness of the symptoms presented by the few cases on record, I should be inclined to regard this operation with a more favorable eye than the other; still we find but two cases in a lapse of seven years, and this certainly does not speak in favor of the operation. We are not authorized to draw any strict conclusion from so limited a number of cases as have been published. We can only hope that the operation will receive a little more attention, and that the results may be found to agree with the expectations that we have of its success.

In conclusion, I think that I am authorized to lay down the following rules: —

1st, That there is no operation, both certain and safe, for the radical cure of Inguinal Hernia.

2d, That, of the operations thus far proposed, the two which present the greatest probability of a cure, with the least chance of a fatal result, are the opera-

tion by injection, and the subcutaneous scarification. Though the latter has not been experimented on so largely, still I am inclined to prefer it.

3d, That, in consideration of the slight danger from hernia, since the modern improvements in trusses, and from the possibility of a radical cure in their use, and also from the possibility that any surgical operation, however slight, in certain states of the system, may prove fatal, this operation is one that had better not be performed, excepting in particular cases.

EXPLANATION OF PLATE.

Fig. 1. SOTTEAU'S instrument ready for use.

Fig. 2. The lower figure represents the needle unconnected with the rest of the apparatus.

The upper figure shows the needle as it appears after the operation.

These figures can be more readily understood by referring to the description already given of the instrument and its application.

Fig. 3. Represents three views of BELMAS' instrument.

No. 1, the instrument as it appears when ready for use.

No. 2 shows it divided into halves.

No. 3, the stylet withdrawn entirely from one half, and partially from the other; showing the conductors through which the filaments of gelatine are passed into the sac.

Fig. 4. VELPEAU'S instrument for scarifying the canal.

Fig. 5. WUTZER'S instrument. This resembles, in its principle and effects, Dupytren's enterotome. It is composed of two pieces of ebony, *a* and *b*, united at one of their extremities by a hinge *d*, by means of which they can be brought together or separated, like the points of a pair of compasses. One of these pieces is a cylinder, four inches long, and three quarters of an inch in dia-

meter. A screw *c*, an inch in length, is placed perpendicularly on the cylinder, an inch from its posterior extremity, and passes through a hole in the other half of the instrument. A nut *g* belongs on this screw, by means of which the two halves are brought together. The cylinder is pierced through its whole length by a narrow canal *h;* giving passage, through the aperture *l*, two or three lines from its extremity, to a slender curved needle. This needle is screwed to a wooden handle *m*, which can be removed after the operation. The other half of the instrument, shaped like a gutter, is pierced with two holes, large enough to allow the needle *i* and the screw *c* to pass through them readily. At the posterior extremity of the cylinder is a small metallic plate *o*, forming with it an angle more or less acute, four or five lines in breadth, and an inch in length : it is divided almost throughout its whole length by a fissure a line in width. This little plate is connected to the ferule at the end of the cylinder by means of the hinge *d*. The upper part of the instrument has a hole *e*, in its extremity, for the purpose of receiving the screw *p*, destined to join firmly the two parts.

Fig. 6. Gerdy's instrument.

a. Handle of the porte-aiguille, perforated to admit the needle.

b. Sheath which conceals the needle.

c. Slide which moves the needle in the sheath.

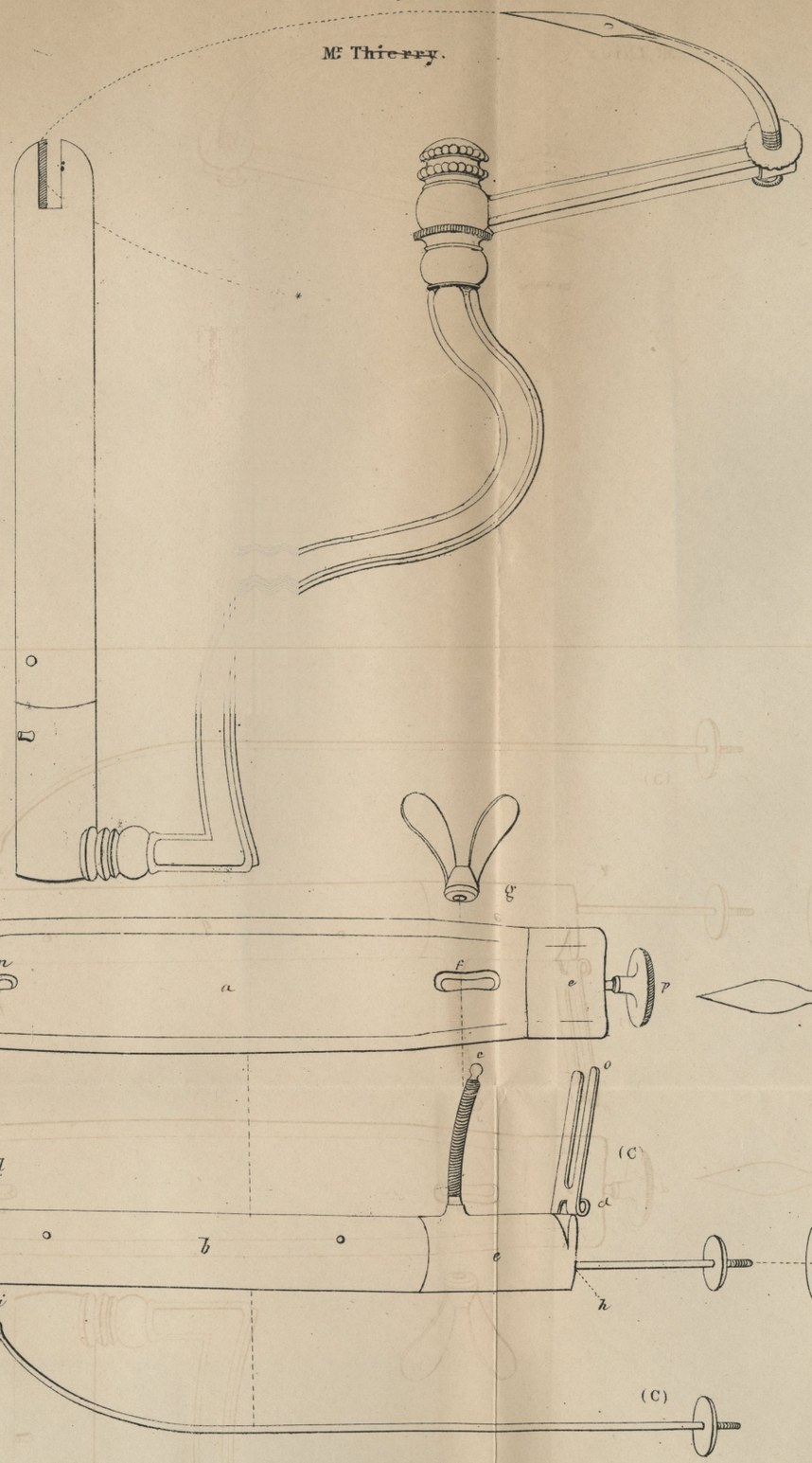
d. Point of the needle.

ee. Two eyes of the needle.

f. Groove connecting the two eyes.

Fig 1.

Mr Thierry.



Mr Sotteau.

Fig. 2.

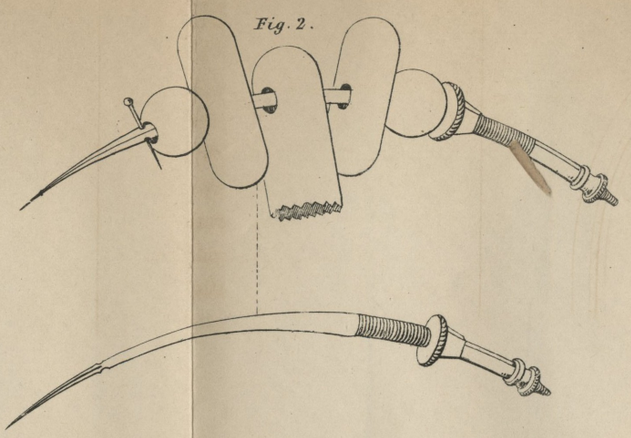


Fig. 3.

Mr Belmas

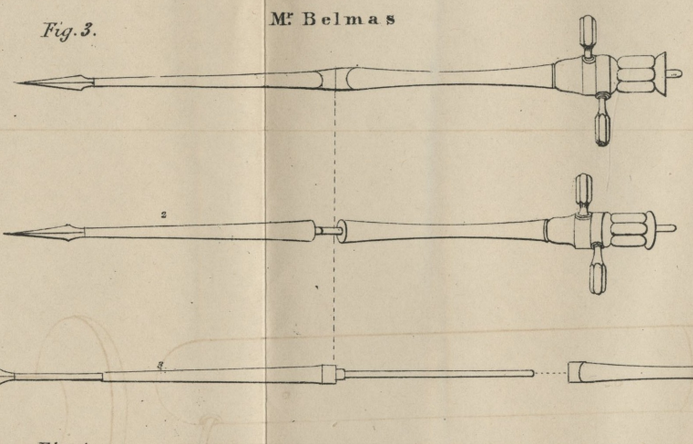


Fig. 4.

Mr Velpeau.

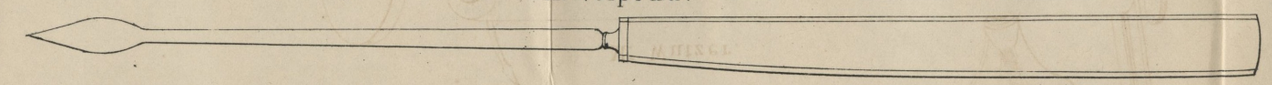


Fig. 5.

Mr Wutzer.

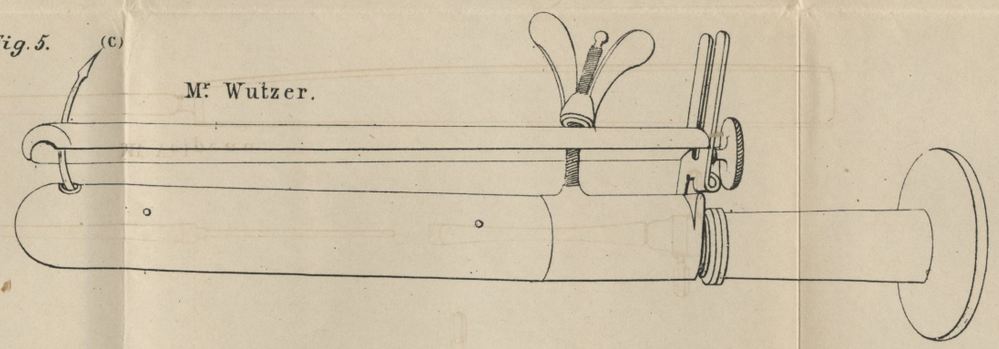
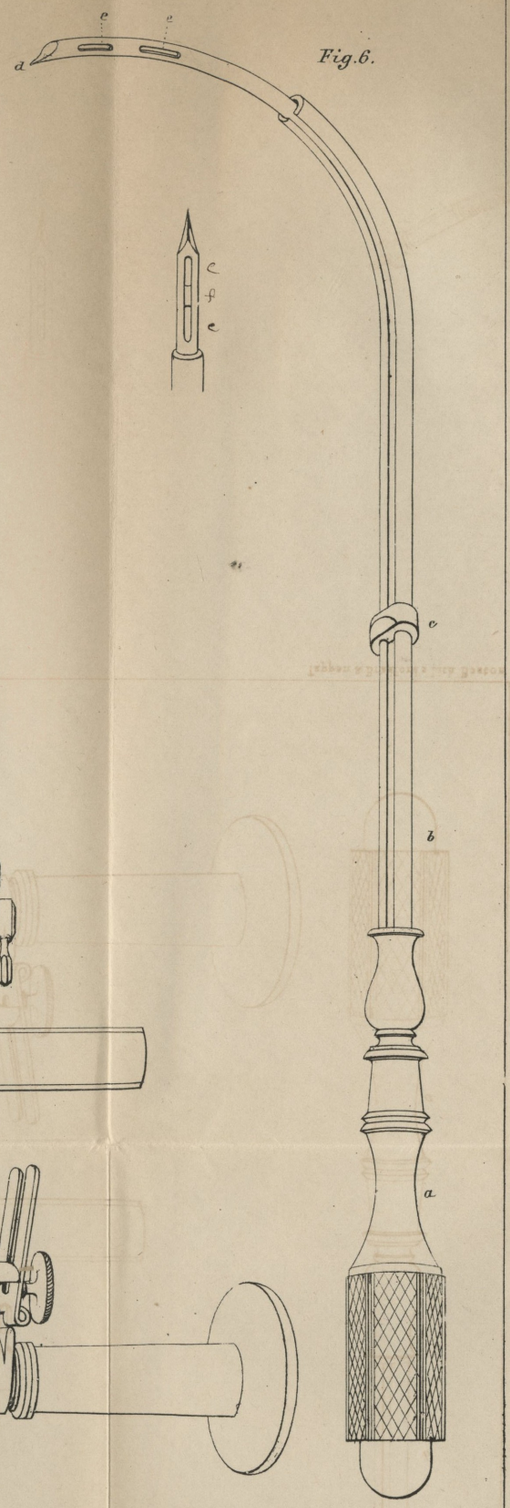


Fig.6.



Tappan & Bradford's Lith. Boston.